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10/007,531	10/26/2001	Ken A. Nishimura	100100321-1	2565

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AGILENT TECHNOLOGIES, INC.  
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Intellectual Property Administration  
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Loveland, CO 80537-0599

EXAMINER
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LEE, DAVID J

ART UNIT	PAPER NUMBER
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2633

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/007,531

Applicant(s)

NISHIMURA ET AL.

Examiner

David Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                            | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 5-6, 8, 11-12, 14-17, 20-22, 25, 28 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Killat (US Patent No. 4,442,550).

Regarding claim 1, Killat teaches a method for performing time-domain equalization, the method comprising: receiving an optical signal (fig. 1, 20) comprising a light pulse having an impulse response impairment (an impulse response is a physical property of a light pulse and impairments exist throughout typical systems); optically splitting the optical signal into a plurality of beams (fig. 1, 22); optically delaying at least one of the plurality of beams (fig. 1- the beams are optically delayed); detecting the plurality of beams to generate respective electrical signal components (fig. 1, 24 & 26); and combining the respective electrical signal components to generate an electrical output signal (fig. 1, 28) representing the light pulse after correction of the impulse response impairment (by performing the steps above as taught by Killat, time domain equalization is achieved and the method is capable of correcting the impulse response impairment of the received light pulse).

Regarding claim 5, Killat teaches the method of claim 1, wherein optically splitting the optical signal includes: providing a beamsplitter; and performing the splitting using the beamsplitter (fig. 1, 22).

Regarding claim 6, Killat teaches the method of claim 1, wherein optically splitting the optical signal includes: providing a diffractive optical element; and performing the splitting using the diffractive optical element (fig. 3, 42 – the grating produces diffracted orders, col. 5, line 1).

Regarding claim 8, Killat teaches the method of claim 1, wherein: optically delaying at least one of the plurality of beams comprises providing a first delay that is operative in part, to provide optical equalization of the light pulse (fig. 1, the beams are optically delayed and partly provides for equalization of the light pulse).

Regarding claim 11, Killat teaches the method of claim 1, wherein, in optically delaying at least one of the beams, each of the beams is delayed relative to every other of the beams (col. 3, lines 10-11).

Regarding claim 12, Killat teaches the method of claim 1, wherein, in combining the plurality of electrical signal components, at least one of the electrical signal components is summed negatively (col. 4, lines 19-23 & lines 53-55:  $S_1(t)$  is summed negatively to  $S_2(t)$  ).

Regarding claims 14 and 21, the beams entering detector 24 of figure 1 can be considered the first sub-beams and the beams entering detector 26 of figure 1 can be considered the second sub-beams. With this consideration in mind, Killat detects the first sub-beams with detector 24 to generate respective first electrical signal sub-

components,  $S_1(t)$  and detects the second sub-beams to generate respective second electrical signal sub-components,  $S_2(t)$ . Combining  $S_1(t)$  and  $S_2(t)$  with amplifier 28 will generate the electrical output signal.

Regarding claims 15 and 22 and applying the considerations above, by summing the first electrical signal sub-components and summing the second electrical signal sub-components and subtracting these sums, an electrical output signal can be generated. See column 4, lines 19-32 for Killat's explanation of this method.

Regarding claim 16 and applying the considerations above, an electrical output signal can be generated by subtracting each of the first electrical signal sub-components (the beams entering detector 24) from a corresponding one of the second electrical signal sub-components (the beams entering detector 26) to generate a respective one of the electrical signal components and summing these electrical signal components.

Regarding claim 17, Killat teaches the method of claim 14, further comprising: providing a splitter and performing the splitting and the dividing using the splitter (fig. 1, 22).

Regarding claim 20, Killat teaches a system for performing time-domain equalization, the system comprising: means for receiving an optical signal (fig. 1, 20) comprising a light pulse having an impulse response impairment (an impulse response is a physical property of a light pulse and impairments exist throughout typical systems); means for optically splitting the optical signal into a plurality of beams (fig. 1, 22); means for optically delaying at least one of the plurality of beams (fig. 1, the beams are

optically delayed); means for detecting the plurality of the beams to generate respective electrical signal components (fig. 1, 24 & 26); and means for combining the respective electrical signal components to generate an electrical output signal (fig. 1, 28) representing the light pulse after correction of the impulse response impairment (by performing the steps above as taught by Killat, time domain equalization is achieved and the method is capable of correcting the impulse response impairment of the received light pulse).

Regarding claim 25, Killat teaches a system for performing time-domain equalization, the system comprising: a beamsplitter adapted to split an optical signal comprising a light pulse having an impulse response impairment (an impulse response is a physical property of a light pulse and impairments exist throughout typical systems), optically into beams (fig. 1, 22); a delay component optically communicating with the beamsplitter (col. 3, lines 6-11: the delay lines have different lengths and communicate with the beamsplitter 22), the delay component being configured to receive at least one of the beams and delay the at least one of the beams optically (col. 3, lines 6-11); an array of photodetectors arranged to receive the beams comprising at least one of the beams (fig. 1, 24 & 26), the array of photodetectors being adapted to generate respective electrical signal components (fig. 1, 24 & 26); and an amplifier arranged to receive the electrical signal components, the amplifier being adapted to generate an electrical output signal (fig. 1, 28) representing the light pulse after correction of the impulse response impairment (by performing the steps above as taught by Killat, time

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domain equalization is achieved and the method is capable of correcting the impulse response impairment of the received light pulse).

Regarding claim 28, Killat teaches the method of claim 1, wherein: optically delaying at least one other of the plurality of beams, the delaying comprising providing a second delay that is operative together with the first delay to provide optical equalization of the light pulse (fig. 1, the beams are delayed and are operative together to provide for equalization of the light pulse through optical delay).

3. Claims 1, 2-4, 8, 11, 14, 18, 20, 23-24 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Lewis (US Patent No. 5,555,119).

Regarding claim 1, Lewis teaches a method for performing time-domain equalization, the method comprising: receiving an optical signal (fig. 1, and col. 8, lines 26-27) comprising a light pulse having an impulse response impairment (an impulse response is a physical property of a light pulse and impairments exist throughout typical systems); optically splitting the optical signal into a plurality of beams (col. 8, lines 26-27); optically delaying at least one of the plurality of beams (fig. 1, 18a-18e, and col. 8, lines 28-29); detecting a plurality of the beams to generate respective electrical signal components (fig. 1, 20a-20e, and col. 8, lines 50-51); and combining the respective electrical signal components to generate an electrical output signal (fig. 1, 21) representing the light pulse after correction of the impulse response impairment (by performing the steps above as taught by Lewis, time domain equalization is achieved

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and the method is capable of correcting the impulse response impairment of the received light pulse).

Regarding claim 2, Lewis teaches the method of claim 1, further comprising: optically scaling at least one of the beams (col. 8, lines 29-30, and fig. 10a, 119).

Regarding claim 3, Lewis teaches the method of claim 2, wherein, in detecting the plurality of the beams, at least one of the beams detected has not been subjected to at least one of (a) the delaying, and (b) the scaling (fig. 1, 18a).

Regarding claim 4, Lewis teaches the method of claim 1, further comprising: electrically scaling at least one of the electrical signal components (fig. 1, 22a-22e).

Regarding claim 8, Lewis teaches the method of claim 1, wherein: optically delaying at least one of the plurality of beams comprises providing a first delay that is operative in part, to provide optical equalization of the light pulse (fig. 1, 18a-18e, and col. 8, lines 28-29; the beams are optically delayed and partly provides for equalization of the light pulse).

Regarding claim 11, Lewis teaches the method of claim 1, wherein, in optically delaying at least one of the beams, each of the beams is delayed relative to every other of the beams (fig. 1, 18a-18e, and col. 8, lines 28-29: each beam has different lengths and therefore is delayed relative to each other).

Regarding claim 14, the beam is split into a plurality of beams, and line 18a of figure 1 can be considered as the first sub-beam, line 18b can be considered as the second sub-beam. Applying this consideration to the rest of the claim, Lewis discloses that the detecting the plurality of beams includes detecting the first sub-beams (18a) to



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generate respective first electrical signal sub-components and detecting the second sub-beams (18b) to generate respective second electrical signal sub-components (the detectors are 20a-20e); and wherein combining the plurality of electrical signal components includes summing the first and second electrical signal sub-components to generate the electrical output signal (fig. 1, 21: the combiner sums the first and second electrical sub-components).

Regarding claim 18, Lewis discloses the method of claim 14, wherein optically scaling at least one of the beams includes attenuating at least one of the first sub-beam and the second sub-beam of the at least one of the beams to set the intensity ratio. Since Lewis discloses that the beam can be sent through an amplifier, the sub-beams are all attenuated (col. 8, lines 29-31).

Regarding claim 20, Lewis teaches a system for performing time-domain equalization, the system comprising: means for receiving an optical signal (fig. 1, and col. 8, lines 26-27) comprising a light pulse having an impulse response impairment (an impulse response is a physical property of a light pulse and impairments exist throughout typical systems); means for optically splitting the optical signal into a plurality of beams (col. 8, lines 26-27); means for optically delaying at least one of the plurality of beams (fig. 1, 18a-18e, and col. 8, lines 28-29); means for detecting the plurality of beams to generate respective electrical signal components (fig. 1, 20a-20e, and col. 8, lines 50-51); and means for combining the respective electrical signal components to generate an electrical output signal (fig. 1, 28) representing the light pulse after correction of the impulse response impairment (by performing the steps above as taught

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by Lewis, time domain equalization is achieved and the method is capable of correcting the impulse response impairment of the received light pulse).

Regarding claim 23, Lewis teaches the system of claim 20, further comprising: means for optically scaling at least one of the beams (fig. 10a, 119).

Regarding claim 24, Lewis teaches the system of claim 20, further comprising: means for electrically scaling at least one of the beams (fig. 1, 22a-22e).

4. Claims 1, 2, 5, 8, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Wickham et al. (US Patent No. 6,708,003).

Regarding claim 1, Wickham teaches a method for performing time-domain equalization, the method comprising: receiving an optical signal comprising a light pulse having an impulse response impairment (an impulse response is a physical property of a light pulse and impairments exist throughout typical systems); optically splitting the optical signal into a plurality of beams (fig. 1, 14, col. 3, line 66); optically delaying at least one of the plurality of beams (fig. 1, 28, and col. 4, lines 15-16); detecting the plurality of the beams to generate respective electrical signal components (fig. 1, 18, and col. 4, lines 24-25: Wickham discloses that the optical detector may be a detector array for detecting a plurality of beams); and combining the respective electrical signal components to generate an electrical output signal (fig. 1, 18: generates the electrical output signal) representing the light pulse after correction of the impulse response impairment (by performing the steps above as taught by Wickham, time domain

equalization is achieved and the method is capable of correcting the impulse response impairment of the received light pulse).

Regarding claim 2, Wickham teaches optically scaling at least one of the beams (fig. 4, 23, col. 7, lines 23-25)

Regarding claim 5, Wickham teaches wherein optically splitting the optical signal includes: providing a beamsplitter; and performing the splitting using the beamsplitter (fig. 1, 14, col. 3, line 66: an optical splitter is interpreted as a beamsplitter).

Regarding claim 8, Wickham teaches in optically delaying at least one of the beams, the at least one of the beams is delayed relative to at least one other of the beams (col. 4, lines 16-18: Wickham discloses that each of the beams has its own modulator for delaying each beam); and optically delaying at least one of the beams includes: providing a first optical path and a second optical path; directing the at least one of the beams via the first optical path; and directing the at least one other of the beams via the second optical path (fig. 1-after being split at 14, the delayed beams are provided several optical paths and directed via those paths).

Regarding claim 13, Wickham teaches in scaling at least one of the beams, the at least one of the beams is optically attenuated relative to at least one other of the beams (col. 7, lines 10-13: Wickham discloses that each beam has its own amplitude modulator for scaling the corresponding delayed beam).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis in view of Killat.

Regarding claim 7, Lewis differs in the claimed invention in that Lewis does not disclose a diffractive optical element to perform the splitting and scaling. Killat, from the same field of endeavor, teaches a diffractive optical element to perform the splitting and scaling (col. 4 line 68 to col. 5, line 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the diffractive optical element of Killat into the system as indicated by Lewis to split the beam into diffracted orders (col. 5, lines 1-2). This is based on a recognition that the claimed difference exists not as a result of an attempt by the applicant to solve a problem but merely amounts to selection of expedients known to the artisan of ordinary skill as design choices.

7. Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis.

Regarding claim 25, Lewis teaches a system for performing time-domain equalization of an information signal represented by an optical signal, said system comprising: a delay component (fig. 1, 18a-18e), the delay component being configured to receive at least one of the beams and delay the at least one of the beams optically;

an array of photodetectors arranged to receive the at least one of the beams, the array of photodetectors being adapted to generate respective electrical signal components corresponding to the at least one of the beams (fig. 1, 20a-20e); and an amplifier arranged to receive the electrical signal components, the amplifier being adapted to generate an electrical output signal representing the information signal (fig. 1, 22a-22e and 21). Although Lewis does not expressly disclose that the splitting is done by a beamsplitter, Lewis does disclose that the beam is split into fiber lines. Therefore, if it is not inherent, it is obvious to one of ordinary skill in the art at the time of invention that there must be a beamsplitter in the system of Lewis.

Regarding claim 26, Lewis discloses an attenuator optically communicating with the delay component and the array of photodetectors, the attenuator being configured to scale at least one of the beams and provide the at least one of the beams to the array of photodetectors after scaling (col. 8, lines 29-30).

Regarding claim 27, Lewis discloses an attenuator electrically communicating with the array of photodetectors and the amplifier, the attenuator being configured to scale at least one of the electrical signal components and provide the at least one of the electrical signal components to the amplifier after scaling (fig. 1, 22a-22e).

8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Killat in view of Ogura (US Patent No. 5,375,004).

Killat discloses all the limitations of claim 19 as discussed above except for that limitation of a polarization-dispersive device. Ogura, from the same field of endeavor,

teaches a polarization-dispersive device (fig. 1, 2, and col. 3, lines 22-23); passing each of the plurality of beams through the polarization-dispersive device to separate the beams into the respective first sub-beam and second sub-beam; and rotating a polarization direction of at least one of the plurality of the beams to set the intensity ratio of the respective first sub-beam and second sub-beam (col. 3, lines 31-37). One of ordinary skill in the art would have been motivated to incorporate a polarized beam splitter as indicated by Ogura in the system of Killat because the use of the polarized beam splitter as a light dividing device results in an advantage that the utilization rate of light is high and there is a minimization in light loss. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate a polarized beam splitter in the system.

### ***Response to Arguments***

9. Applicant's arguments filed 12/23/2004 have been fully considered but they are not persuasive.

Regarding claim 7, Applicant states that the claimed invention is directed towards a method for performing time-domain equalization, while Lewis discloses a process for digital sampling of individual pulses. However, both Applicant and Lewis claim the same method and therefore both are capable of the same results. Also, Applicant argues that there is no suggestion or motivation to modify Lewis or to combine Lewis with Killat. However, both Lewis and Killat teach a method of receiving an optical signal comprising a light pulse having an impulse response impairment; optically splitting the

optical signal into a plurality of beams; optically delaying at least one of the plurality of beams; detecting the plurality of beams to generate respective electrical signal components; and combining the respective electrical signal components to generate an electrical output signal representing the light pulse after correction of the impulse response impairment. Splitting and scaling a beam using a diffractive optical element is well known in the art (col. 4, line 68 to col. 5, line 2 of Killat), and since both references teach the same steps, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the DOE of Killat in the system of Lewis.

Regarding claim 19, Applicant argues that the Office action does not point out where in Killat can be found a suggestion or motivation for carrying out time-domain equalization of an optical signal. However, although Killat does not explicitly disclose that the method is for carrying out time-domain equalization, Killat teaches the same steps as the Applicant, as recited in claim 1, and discloses the same system as recited in claims 20 and 25. Therefore, since the steps, the means, and the system of Killat are the same as the claimed invention, it follows that the system of Killat is capable of carrying out time-domain equalization as well.

Regarding claim 25, Applicant argues that the Office action does not point out where in Lewis can be found a suggestion or motivation for carrying out time-domain equalization of an optical signal. However, although Lewis does not explicitly disclose that the method is for carrying out time-domain equalization, Lewis teaches the same steps as the Applicant, as recited in claim 1, and discloses the same system as recited in claims 20 and 25. Therefore, since the steps, the means, and the system of Lewis

are the same as the claimed invention, it follows that the system of Lewis is capable of carrying out time-domain equalization as well.

### ***Conclusion***

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:30pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DL



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